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NASA SimLabs News

Newsletter

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Welcome New Subscribers!

If you are receiving this newsletter for the first time, SimLabs News is a quarterly publication reviewing current projects at the NASA Ames Simulation Laboratories (SimLabs). NASA [SimLabs](#) is comprised of three unique Flight Simulators, an Air Traffic Control radar simulator and a high fidelity Air Traffic Control Tower simulator. The facilities support government as well as private industry in a wide array of applications. To find out more, read on!

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1. Ivanpah Valley Airport Design Validation Study

NASA Ames' SimLabs is working

with ASRC Research and Technology Solutions to support the Clark County Department of Aviation's plan to implement a new supplemental, full service international airport near Las Vegas in the near future. A series of real-time simulations are in development at FutureFlight Central that will validate the airport layout and one alternative, utilizing human-in-the-loop operational testing. The simulations will measure efficiency, flexibility, and safety of surface operations under various flow directions, traffic levels, and visibility conditions.



Figure 1. Future Ivanpah Valley Airport Site

McCarran International Airport

(LAS) in Las Vegas, Nevada is the sixth busiest airport in the nation. LAS is expected to reach its capacity of about 55 million passengers a year in by 2015. The proposed airport, located on a 6000-acre dry lakebed in the Ivanpah Valley, will help alleviate congestion at LAS which can no longer expand because of housing and commercial development that surrounds it. The new airport is scheduled to open 2017, servicing 6 million passengers per year.

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2. Second Annual Airport Workshop Focuses on Technology

Over 175 airport industry and government professionals listened to a stimulating keynote address by David Evans, Chief Technologist of Cisco System's Internet Business Solutions Group, at the second annual [FAA/NASA/Industry Airport Planning Workshop](#) at NASA Ames Research Center, September 12-13, 2006. The thought-provoking presentation on the future growth in information technology (IT), set a recurring theme of technology solutions to meet the airport capacity demands of the future.

NASA Ames' SimLabs and the Federal Aviation Administration (FAA) Office of Airport Planning and Programs jointly sponsored the workshop. Many thought-provoking discussions on airport planning needs and presentations of successful IT-based projects were given over the course of the two days. Presentations and photos from the event are available on the [Workshop website](#).





Figure 2. Workshop Opening Panel (l to r): Greg Principato (Airports Council International ñ North America (ACI-NA)), Dennis Roberts (FAA), Randy Walker (Clark County Department of Aviation), Joseph Richardson (United Postal Service), Steve Martin (ACI-NA), and Kurt Haukohl (California Department of Transportation)

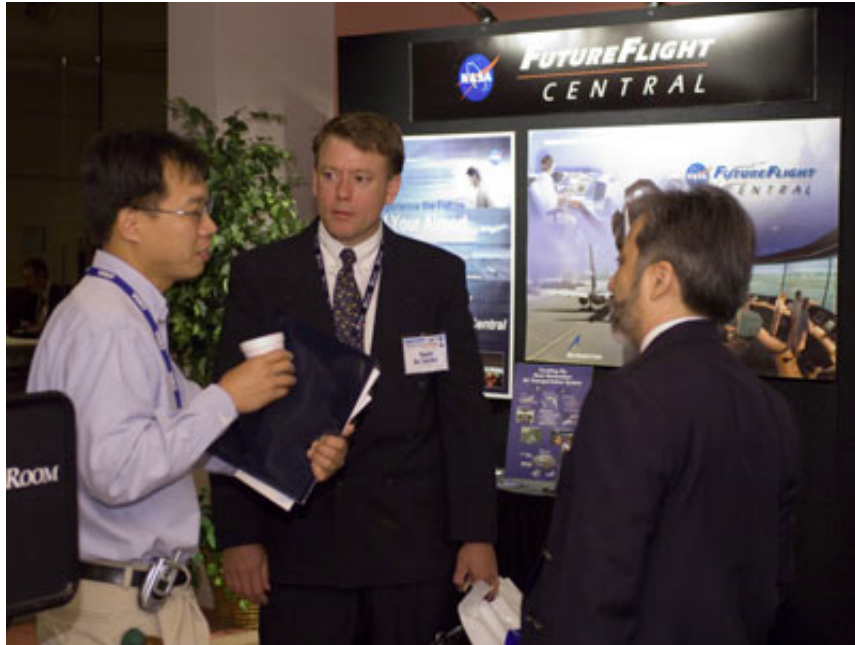


Figure 3. Yoon Jung (NASA), David Schleicher (Sensis Corp.) and Victor Cheng (Optimal Synthesis, Inc.) compare notes on airport surface technology during a break.

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3. Simulation Elucidates Issues in Airport Automation

Some day, computers will control the movement of every plane and vehicle on the airport surface. If that makes you nervous, don't worry because the transition from human control to computer control will be gradual and cautious. NASA and other agencies working on the Next Generation Air Transportation System (NGATS) are developing the technologies and concepts to increase capacity, and surface automation is a key component.

However, researchers testing early concepts of how automation could work, have identified fundamental human factors issues that must be resolved before further concept definition. Using the advanced human-in-the-loop simulation facilities at NASA Ames SimLabs to replicate a realistic airport



environment, the [Surface Operations Automation Research \(SOAR\)](#) concept was studied in September 2006.

Simulation data and air traffic controller feedback, acquired as part of the test, revealed that fundamental operational questions must be answered before proceeding down a design path.

For example: What information is needed by the controllers to use the automation tools effectively? What is the best way to present it and when? At what points should humans authorize automated directives? What should the automation do about non-conforming aircraft? And how can the system account for the variation in response time of pilots and controllers when the information is time-critical?

The experiment results were very informative and will help determine the requirements for surface automation in NGATS. Long-term benefits will be reduction or elimination of aircraft stopping or holding on the surface, enhanced safety through the accurate and timely prediction of impending conflicts, and increased capacity.

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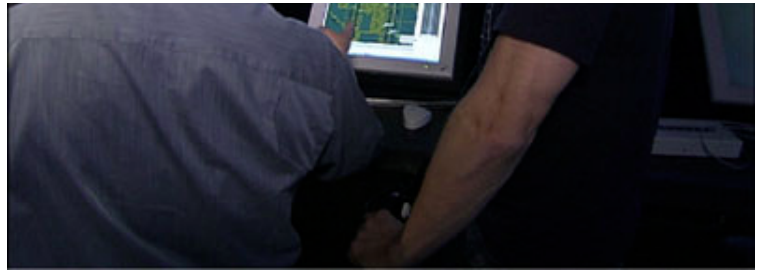


Figure 4. SOAR concept developer and air traffic controller confer during simulation test.

4. Do Pilots Really Need Perfect Vision?

The United States Air Force (USAF) wants to know how important certain aspects of vision are in operational flight performance. Current pilot vision requirements were developed after World War I and, for the most part, have remained unchanged. Any individual wishing to become a pilot must have vision that meets or exceeds certain requirements for 20/20 acuity, color detection, depth perception, field of view, and eye alignment & coordination.

However, other factors such as contrast sensitivity, low-light performance, targeting ability and visual attention are not well understood for how they affect pilot performance. The USAF is seeking an efficient way to bridge the current lack of knowledge between clinical vision standards and operational performance. In other words, what vision tests should pilots be required to pass to enable optimal performance for given tasks?

To help answer this question, NASA Ames Research Center Simulation Laboratories and Human Factors Directorates conducted a feasibility study called Operational Based Vision Assessment (OBVA). The initial study was to determine if it is feasible to build a high-fidelity aircraft simulator that can represent 20/10 visual acuity. The results of the study produced a qualified *yes*, i.e. yes, with some limitations, and a conceptual design for the simulator. Existing state-of-the-art simulator visual systems are not capable of producing images with 20/20 resolution. See Figure 5.

Maximum Resolution of Existing Systems vs. Proposed OBVA



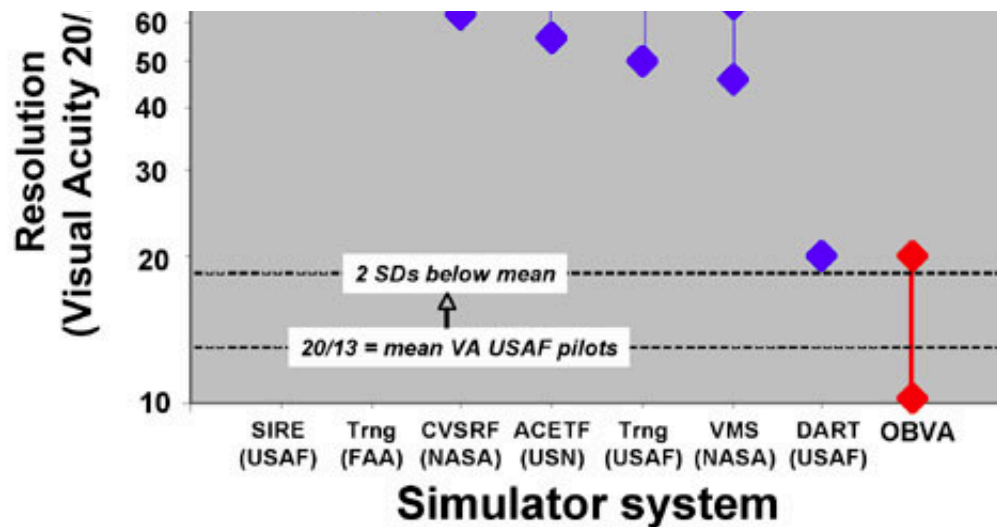


Figure 5. Comparison of state-of-the-art visual systems and future OBVA simulator.

The next step will be to test and validate the design by building a small version of the system to study those limitations. This system will be the first of its kind and is comprised of slightly customized off-the-shelf components. The dedicated generic visual system is designed to be reconfigurable and upgradeable. SimLabs anticipates conducting verification and validation component testing of the system in 2007. The OBVA simulator will be used to assess the relationship between operational performance and clinical measures.

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5. Thinking of Doing Business with NASA SimLabs?

For more information on what we can do for your needs, contact:

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